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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/653,152	09/03/2003	Chandra Mouli	M4065.0970/P970	2509

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EXAMINER

WILSON, ALLAN R

ART UNIT	PAPER NUMBER
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2815

DATE MAILED: 04/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

EP

Office Action Summary	Application No. 10/653,152	Applicant(s) MOULI, CHANDRA	
	Examiner Allan R. Wilson	Art Unit 2815	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 March 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-50 is/are pending in the application.
4a) Of the above claim(s) 9-15, 21-39 and 47 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 16-20, 42 and 43 is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-8, 16-20, 40, 44-46, 48 and 49 is/are rejected.
- 7) ☒ Claim(s) 5, 41-43 and 50 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>03/16/2005</u> | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

Newly submitted claim 47 is directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: Claim 47 is part of Group III, drawn to combination with a semiconductor device.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claim 47 is withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-4, 6-8, 16-20, 40, 44-46, 48 and 49 are rejected under 35 USC § 103 (a) as being unpatentable over McClure, U.S. Patent No. 6,780,666 B1 (or Applicants Prior Art) in view of Tews et al. ("Tews") U.S. Patent No. 6,362,040 B1.

With regards to claim 1, McClure illustrates in figures 1-6, a photosensor 12 having a first doped region 12a and a second doped region 12b in association with a semiconductor substrate 14; an isolation region 32 formed within said substrate.

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McClure does not show a halogen-rich region localized at least at a sidewall region of said isolation region. Tews illustrates in at least figure 5 a halogen-rich region localized at least at a sidewall region 123 of an isolation region. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a halogen-rich region for oxidizing trench sidewalls which reduces crystallographic orientation dependence.

With regards to claim 2, Tews illustrates in fig. 5 said halogen-rich region is in the sidewalls of the trench and therefore when combined with Lin said halogen-rich region will be between said isolation region and said photosensor.

With regards to claims 3, 17, 40, 44 and 49, Tews discloses in col. 5, lines 35-36, said halogen-rich region is formed with an ion selected from the group consisting of fluorine and bromine.

With regards to claim 4, Tews illustrates in fig. 5 said halogen-rich region is in the sidewalls of the trench and therefore when combined with McClure said halogen-rich region and said first doped region 12a of said photosensor will overlap.

With regards to claims 5 and 16, McClure and Tews discloses the claimed invention except for said halogen-rich region has a depth from a surface of said semiconductor substrate of about 300Å to about 800Å. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a depth of 300Å to about 800Å, since it has been held that where the general conditions of a claim are disclosed in the prior art discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

With regards to claim 6, Tews discloses in col. 5, lines 48-51, said halogen-rich region has a concentration of halogen ions from about $1 \times 10^{14}/\text{cm}^3$ to about $1 \times 10^{15}/\text{cm}^3$.

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With regards to claims 7 and 18, McClure illustrates in figures 1-6 a charge collection region 18 electrically connected to readout circuitry 24, 26, 28.

With regards to claims 8 and 19, McClure illustrates in figs. 1-6 a transfer transistor 16 formed between and connecting said photosensor 12 and said charge collection region 18.

With regards to claim 20, McClure illustrates in figs. 1-6 a reset transistor 22 electrically connected to said charge collection region 18.

With regards to claim 45, the limitation “for suppressing the flow of dark current from said photosensor” is an inherent function of the structure and since the prior art has the same structure and materials as the claimed invention it will have the same inherent function.

With regards to claim 46, Tews discloses in col. 5, lines 42-51, a concentration of halogen ions from about 1×10^{14} to 1×10^{15} atoms/cm³.

With regards to claim 48, the limitation “for suppressing the presence of charge collecting dangling bonds of said substrate at the sidewall region” is an inherent function of the structure and since the prior art has the same structure and materials as the claimed invention it will have the same inherent function.

Allowable Subject Matter

Claims 16-20, 42 and 43 are allowed.

Claims 5, 41-43 and 50 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

Applicant's arguments filed 03/10/2005 have been fully considered but they are not persuasive.

The argument that Tews does not teach or suggest "a halogen-rich region localized at least at a sidewall region of (an) isolation region," is not persuasive. Tews discloses in col. 1, lines 14-17, the "structures fabricated on the substrate may include trenches for isolation regions."

Tews' "DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS" appears to be a vertical transistor, however the use of a halogen-rich region localized at least at a sidewall can be used for isolation regions (as disclosed above). Therefore, the halogen-rich region can be used on McClure to reduce crystallographic orientation dependence (Tews col. 1, lines 8-10).

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from an examiner should be directed to Primary Examiner Allan Wilson whose telephone number is (571) 272-1738. Examiner Wilson can normally be reached 7:00-4:00 Monday-Thursday and 6:00-3:00 on Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Allan R. Wilson
Primary Examiner
4 April 2005